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Foundry Education

The progress which is being made in this country with regard to foundry education is distinctly patchy. On the highest levels, the metallurgical departments of the Universities are filling up rapidly. They can be relied upon to overcome the not inconsiderable difficulties of staff accommodation with which they are beset. It is not pleasant to learn that a further setback has been experienced in the re-establishment of the Foundry School, owing, so gossip has it, to the difficulty of getting accommodation in Birmingham. If this be true, then the possibilities of other centres must be examined, as the matter is urgent. The established technical schools, where foundry subjects are taught, are still in the transition stage, as classes for teaching elementary technology to budding munition workers are giving place to courses for instructing both British and American Servicemen. Finally, there is the question of classes for the ordinary boy in the foundry. Here it is with real pleasure that we refer to the excellent start that has been made in the Manchester area. The record of the past year's effort is noteworthy. Stoke, too, is making good progress. Sheffield still finds difficulties in persuading the boys to attend evening classes.

In London, after much patient endeavour, there is every hope that a one-day-a-week class will start to function at the Borough Polytechnic early in November. The local committee, sponsored by the London branch of the Institute of British Foundrymen, and reinforced by representatives from the employers' federations, trade unions and educational authorities, set out with the object of creating classes throughout the area. *Questionnaires* were sent to every foundry in the area, but the number of youths employed by the firms which answered was so small that it was decided to concentrate on the establishment of one centre—the Borough Polytechnic. This was done on account of its central location and the well-known enthusiasm for foundry practice technology of the principal, Dr. D. H. Ingall. His record of successes in the Black Country and at the Constantine Technical College at Middlesbrough gives hope of a repetition for London. It starts off with a roll of two entrants under 16 and about 18 to 20 above that age. The reactions of foundry owners is interesting. Those located some eight to 12 miles from the centre of London complain of the distance and travelling time, yet those situated 30 miles distant raise no such objections. However, much as we would like the suburban foundry owners to support the Borough scheme, we feel sure that the London committee will co-operate with any local effort if they see the slightest prospect of success. Suburban foundry owners, however, should remember that the committee have in their possession much data as to the youth "population" in the local shops, and it is on this basis that they so strongly recommend basing all activities on one educational centre. If recruitment develops so strongly in any one suburban district then further steps can be taken to supply local educational needs.

It has been announced that owing to the dearth of buildings and teachers, the implementation of the Education Act has been postponed until 1947, and this involves, we believe, that the young people's colleges will not be inaugurated until 1949. Yet those industries which anticipate what has been established as the minimum educational facilities of the future by acting in the spirit of them now will reap a rich reward by the acquisition of a more intelligent staff for their conduct.

CONTEMPORARIES OF Mr. George Marlow-Graham at the metallurgical department of Sheffield University will be pleased to learn that, though badly depleted of personal and household necessities, he is feeling quite fit. He was appointed to a post at the Stavanger Electro-Staalwerk a.s. in Jørpeland, Norway, several years before the last war and has remained there ever since. Mr. Marlow-Graham has spent the major part of this war in prisons and internment camps in both Norway and Germany.

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HADFIELD'S FOUNDRY REVISITED

APPLICATION OF TECHNOLOGICAL CONTROL

Our representative was recently accorded the privilege of revisiting the extensive steel foundries of Hadfields, Limited, of Sheffield. There was an interval of some eight to 10 years between the two inspections and the changes noted were of a revolutionary nature. An outstanding difference is the present-day intensive application of technological control. In the old days, the gap between the research department and practice had not been sufficiently narrowed. Nowadays, it is obvious that there is a complete integration of endeavour. Sand preparation will serve as just one example. There exists in the research laboratory a department devoted to the carrying out of work designed to provide new knowledge, whilst in the actual foundry is a small shop well equipped for routine testing.

A second feature which is striking to those who have not been in the foundry for some years is the existence of a wide, well kept pathway running the complete length of the 1,000-ft. long shop. Certain characteristics have, however, been maintained; for instance, the foundry still deserves the title of Britain's most diverse melting shop. Here under one roof there are installed the open hearth; the original type of Bessemer (bottom blown); the electrode and high-frequency types of electric furnaces and the crucible.

Standardisation of Colliery Tub Wheels

Whilst the foundry is preponderately a jobbing shop, it is so big that quite large sections are mechanised. Here it seems germane to interpose that a large area is devoted to the making of colliery tub wheels, yet whilst moulding machines are used to a maximum, so little progress has been made in the practical application of standardisation of shape and size, that complete mechanisation has had to be deferred. A piece of equipment which is a useful newcomer to the mechanised plants is the Stirling knock-out. Operating on a vibrational system it expeditiously frees boxes from sand and casting and does so with a commendable absence of dust.

The most interesting feature about the organisation of the foundry is the smooth and rapid transition from implements of war to peace productions. But a few weeks ago the foundry was filled with tank turrets, naval castings and the like. Now only 15 per cent. of the output can be classified as "munitions." The major production is now points and crossings; crusher plant; dredger plant for the tin mines of Malaya; general engineering castings—castings previously imported from Germany, down to quite small stainless castings made from high-frequency furnace steel.

Training of Apprentices

There are apprentices in the shops, where they receive a well graduated practical training under the supervision of a specially qualified moulder. The social welfare of these boys has every consideration, but there is still a lack of bathing facilities. The provision of these amenities is extremely difficult in old-established concerns because of the lack of available space within the precincts of the works.

The heat-treatment shop is also of impressive size for not only are all castings passing through this department, but also the products of the forge. It is obvious that during the war a thorough overhaul has taken place, and whilst exact thermal control has been maintained at its previous high standard, more attention has been paid to thermal efficiency.

The firm is fortunate in the possession of well-equipped machine shops, for it is an obvious advantage to the customer to be able to be supplied with finished machined castings of the larger variety or complete plant, as is done in the case of crushing machinery.

The despatch department was obviously clearing away the goods as fast as they could be made. If there are similar conditions at the ports, then Hadfields must already be making a noteworthy contribution towards balancing the external trade of this country. When normal conditions return to the publishing trades and paper allocations are no longer so attenuated, we hope to give a proper full-length description of the present up-to-date character of this foundry, which it so richly warrants.

INSTITUTE OF VITREOUS ENAMELLERS

PROGRAMME FOR ANNUAL MEETING

The annual meeting of the Institute of Vitreous Enamellers will be held from November 29 to December 1, the headquarters being the Park Hotel, Cardiff. The following programme has been arranged:—

NOVEMBER 29.—12.15 p.m., meet at Newport (Mon.) station. Buses will leave, for those who reserve accommodation, at 12.30 for the works of Richard Thomas & Baldwins, Limited; 1.30 p.m., luncheon at the works, followed by a tour of the new strip mill; 8 p.m., dinner at the Park Hotel.

NOVEMBER 30.—9.30 a.m., Council meeting; 10.15 a.m., annual general meeting; 11 a.m., Paper by Prof. C. A. Edwards, of Swansea University, on "Mild Steel and its Properties, with Special Reference to its Working and Age-hardening"; 1.15 p.m., luncheon at the Park Hotel; 2.45 p.m., technical Paper; 8 p.m., dinner at the Park Hotel.

DECEMBER 1.—9.45 a.m., buses leave the Park Hotel for the works of Curran Bros., Limited, where the latest spray pickling plant will be seen in operation; 1 p.m., luncheon at the Park Hotel. A theatre party will be arranged for the evening for those desiring to return on the Sunday.

THERMIT CASTINGS

The thermit welding process has now been adapted to the production of steel castings. As in making thermit welds, says "Steel" for July 9, finely divided aluminium and iron oxide are ignited in a crucible. The molten metal is then poured into a mould after cooling somewhat from the peak temperature of over 2,000 deg. C. A typical steel analysed C, 0.25; Mn, 0.68; Si, 0.11; Al, 0.60; S, 0.02 to 0.04; and P, 0.02 to 0.04 per cent.

THE MODERN SPECIALISED FOUNDRY*

An attraction to young recruits to the industry

By WILLIAM JONES

In this Paper the Author will attempt to live down the name with which foundries are usually associated and show that the foundries of to-day call for machinery of high precision, and that more care and planning are required in them than some present-day machine shops. Also, that a foundry can be a clean, healthy, adequately lit and well organised department; in fact, it must be if it is to attract the future foundryman.

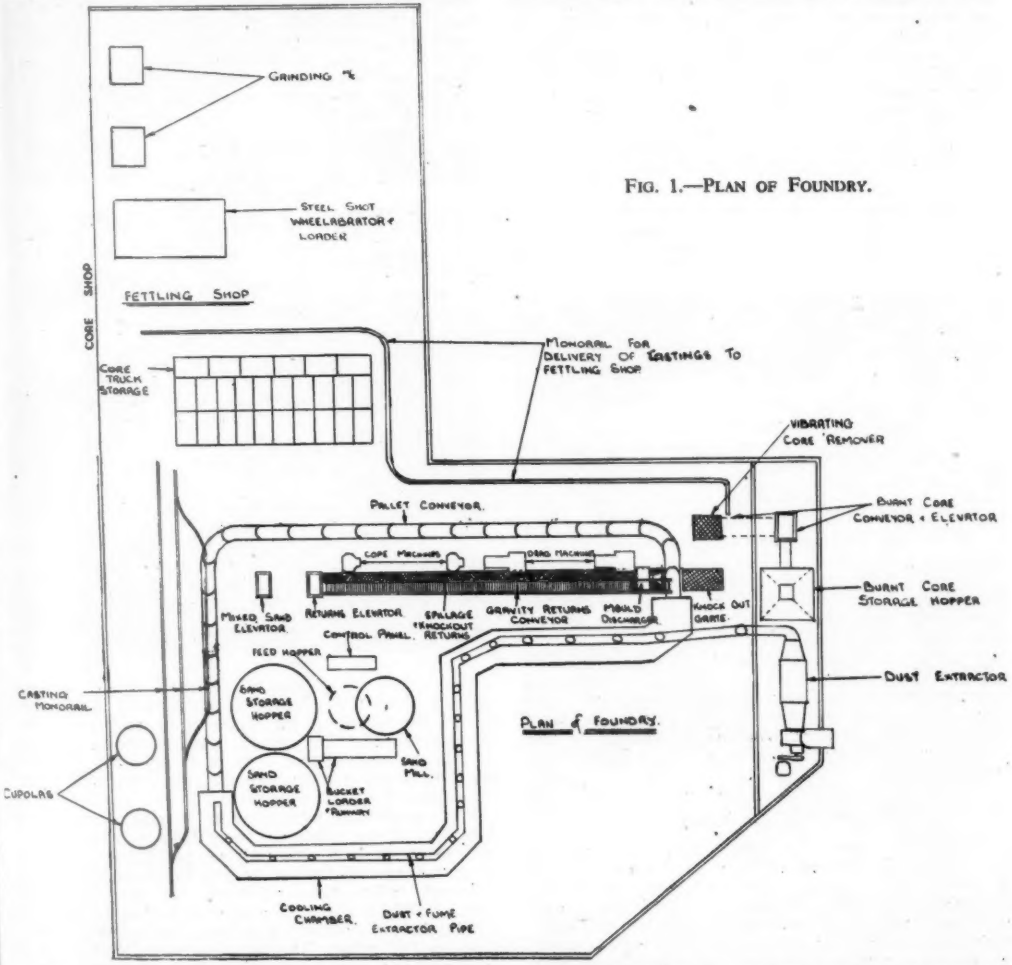

FIG. 1.—PLAN OF FOUNDRY.

* Joint winning entry for the S. W. Wise memorial prize, organised by the West Riding of Yorkshire branch of the Institute of British Foundrymen.

The Modern Specialised Foundry

Some may say that all modern foundries are well planned; this, however, is not the case. All too many of our foundries lack modern costing, planning and control methods. More use should be made of the outside specialists who can advise on difficult planning problems. Many foundries instal a new conveyor and place it two or three yards from the machine, thus losing 20 per cent. of its efficiency, when by means of a by-piece or some slight alteration to the plant, this difficulty, extra work and loss of moulds would be eliminated. Such small things as wheeling sand, carrying cores, hand-mixing and riddling sand, bad patterns, bad lighting, etc., all point to bad organisation and bad work; usually it is through the short-sightedness of the management in capital layout, or lack of executive initiative. Surely, this war and America have proved that the future rests in mass production, giving a reduced priced casting to the everyday man, and thus forming a larger market than pre-war days.

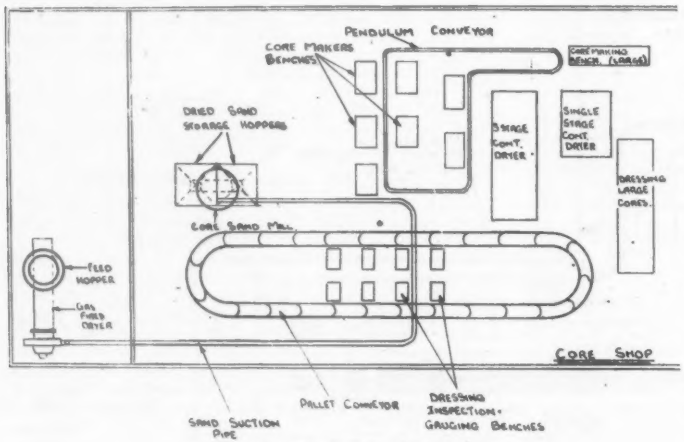

FIG. 1A.—PLAN OF CORESHOP.

Features of the Foundry

The foundry, shown in Figs. 1 and 1A, is one of the wartime projects and gives a good example of a well-planned and efficient foundry, giving the maximum production with the maximum of comfort and cleanliness to the employee, and embraces many good mechanical devices. Adequate head room was allotted, and care was taken to eliminate any projections that might cause inconvenience or hurt to the employee. The floor is concrete, giving the maximum of cleanliness. The lighting was given very great care and day lamps were installed to cover all the foundry. Special jobs such as moulding, core-setting, inspection, core-making, etc., were fitted with the fluorescent lights.

First, for mould making, there are two jolt squeeze rollers, only one being used at a time, the second acting as a duplicate in case of breakdowns and cleaning. Three factors influence the speed on these machines. First, the moulder's empty boxes must be within hands' reach; secondly, his sand should be continually ready in a hopper above him; and, lastly, he should be able to place his finished mould on to the conveyor with the minimum of effort. These are all made possible by the correct positioning of the conveyors and plant (Fig. 2). The Author would, at this point, like to apologise for the fact that the photographs were all taken before the plant was in operation, and are, therefore, not complete in the described equipment.

The moulds are placed on a pallet conveyor. This automatic type of conveyor has a great psychological effect on the employees. It will be found that the human element is always trying to beat the conveyor and very seldom does the pallet go down the shop without its mould. In this way the conveyor becomes the shop pace-setter, one which does not tire, and gives an increase in a most psychological manner. The speed of these conveyors can be adjusted to suit various conditions. The moulds are then conveyed down the shop, passing the next operation. Here the moulds are inspected and the cores cleaned off and set into position.

The next stage is the topping. There are two jolt squeeze pin lifts, and again only one is in operation (Fig. 3). The runner bush is fastened on to the top squeeze plate, and a cutter is attached to the bottom plate. On squeezing, the runner is cut and the runner bush is formed. The runner bush has been designed to take a strainer core. As each mould passes this machine, a top is placed on the mould and a strainer core inserted.

The moulds then pass along to be weighted and cast. After weighting, they are cast from a teapot-spout ladle running on a monorail set parallel to the conveyor. A special feature here is the junctions of the overhead rails; these all work on the trolleybus system. When the ladle operator wishes to go past a point, he pulls a chain which operates a compressed-air valve and point. This prevents ladles taking wrong turns and is a very quick method of negotiating junctions. After casting, the weights are removed and the moulds pass to a cooling tunnel. This piece of equipment is one of the most important features in the

foundry, for, while the moulds are in it, all fumes and dust are carried through a wet dust-extraction plant, and by this method the shop is kept free from

FIG. 2.—JOLT SQUEEZE ROLL-OVER MACHINES ARE USED FOR MAKING THE DRAGS.

one of the most vexing foundry problems—that of dust and fumes.

The conveyor and tunnel are arranged so that all moulds are left under the tunnel for a period, depending on the speed of the adjustable conveyor. After leaving the cooling tunnel, they arrive at the knock-out section (Fig. 4). The moulds are pushed off the pallet conveyor by an automatic arm on to a vibrating grate, which shakes out the sand, leaving the castings and empty boxes on the grate. The castings are then transferred to a second vibrating grate and the empty boxes put on the returns gravity roller conveyor ready for re-use by the machines. The second vibrating grate shakes out all the cores, which fall through on to an asbestos belt conveyor. This conveyor passes under an overband magnetic separator to remove all scrap metal. The conveyor then drops the burnt core sand into a bucket elevator, which takes it up to a storage hopper. This hopper is so placed that the lorries can back straight under and fill up from the hopper shute. This saves much time and back-breaking work shovelling.

To return to the vibrating grate. This is a square grid grate supported at each corner on an anti-vibration spring. It is pivoted across the centre on a cam drive, which, when driven, moves the grate in a rocking motion; this is taken up on the springs. This shaking serves to remove the cores. A core which took 25 min. to remove by hand can be cleaned out in 2 min. It will be seen that this method is far in advance of the old for its cleanliness, speed and comfort.

Sand Mixing, Distribution and Returns

The sand which is shaken out of the moulding boxes falls through the grate on to a rubber belt conveyor, which travels the length of the shop and serves the machines as a spillage returns. It passes under a

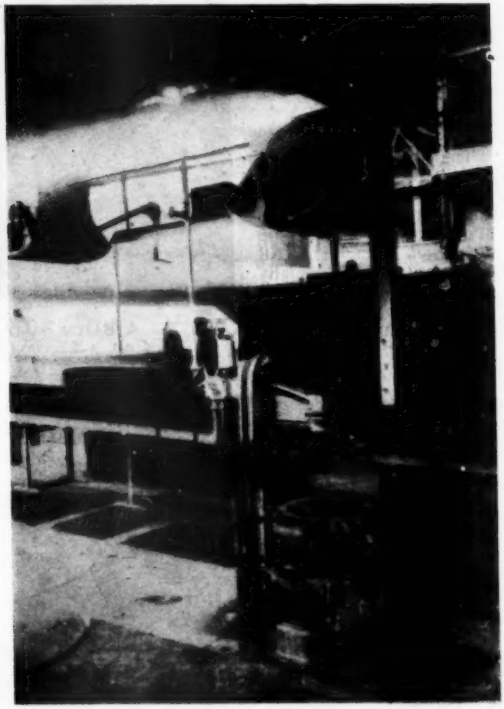

FIG. 3.—JOLT SQUEEZE PIN LIFT MACHINES MAKE THE CORES.

The Modern Specialised Foundry

magnetic separator and up to a screen by means of a bucket elevator. From the screen it goes along a rubber belt to the storage hoppers. The bottom of each hopper has a revolving plate and, when this is switched on, the sand passes between the hopper and plate and is diverted by an arm into a bucket loader. After new sand additions have been made, the bucket automatically comes up its runway and tips itself into the sand mill. The sand mixer is one of the batch type. The water is added by a water gauge attachment fitted to the mill.

When the sand is released from the mill, it falls on to a fast revolving drum to which is attached a number of spikes, these break up the sand and act as an aerator. The sand falls into a hopper placed beneath the mill. This hopper has a revolving table, and the sand then is able to flow continually on to a rubber belt which takes it up to the machines by means of a bucket elevator and a scraper type conveyor. Thus, in effect, the batch mill is turned into one which continuously delivers sand to the machines (Fig. 5).

FIG. 4.—MOULDS LEAVING THE COOLING TUNNEL ARE AT THE KNOCK-OUT POSITION.

Dust-extraction Plant

The foundry is equipped with an efficient dust-extraction plant, the main line running over the top of the cooling chamber up to a wet extractor. All the plant which usually gives off dust has been connected into this. First, the sand mill. This is totally enclosed, and has a small trap-door for sampling; secondly, the loader bucket, round the top of which runs an open funnel which sucks up the dust that is rising during filling. All conveyor belts, knock-out grates, Wheelabrator and grinding machines are connected to the main pipe.

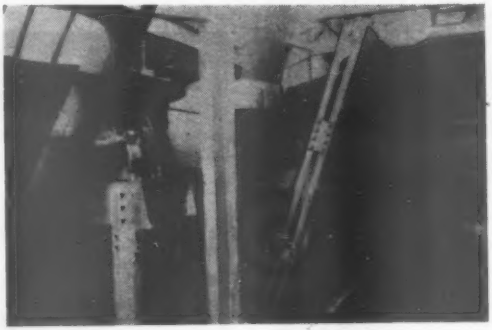

FIG. 5.—A BATCH SAND MILL IS SO OPERATED AS TO GIVE A CONTINUOUS SUPPLY OF SAND.

Another modern feature is the electrical control panel from which all plant is started. The plant is so wired that all machinery must be started off in a definite sequence. It is, therefore, impossible for the operator to switch on any piece of equipment out of turn, and cause a pile up on the conveyors, etc. The sanitary arrangements were carefully planned, and lavatories, cloakrooms and washing equipment for both men and women were built, so enabling them to wash and change after work.

FIG. 6.—GENERAL VIEW OF THE CORESHOP.

Core Department

The sea sand is dried by a gas-fired, horizontal, revolving drum which is fed by means of another revolving bottom-plate hopper. On entering the drum, the sand is rolled through the drum and is dried by passing through the gas flame. It is then ejected into a pipe containing an air stream. It is similar to the pipes used for unloading ships of wheat. The sand is sucked up the pipe and passes through the roof and along to the storage bins.

The storage bins have been placed above the core-sand mixer and, when a mix of sand is required, the operator fills a measuring skip which is suspended

(*Continued on page* 142.)

A STUDY OF MOULDING METHODS FOR SOUND CASTINGS

By FREDERICK G. SEFING

Discussion on the American Foundrymen's Association Exchange Paper read at the annual meeting of the Institute of British Foundrymen, Mr. P. H. Wilson, O.B.E., in the chair. The Paper was printed in our issue of September 13.

Greetings from America

Before Dr. A. B. Everest presented the Paper, MR. V. DELPORT, the European representative of the American Foundrymen's Association, said that he would not like that meeting, at which an American Exchange Paper was to be presented, to pass without extending to those present the hearty greetings of the American Foundrymen's Association. He could assure them, from the personal correspondence he had with their friends in America, that over there they fully appreciated the efforts which had been made in this country during five years of war. Any British member who was able to attend the American Congress in 1946 would be heartily welcomed. There was a sentimental reason for expecting it to be a very good meeting, because 1946 was the fiftieth anniversary of the foundation of the A.F.A. In conclusion, Mr. Delport expressed every good wish for the success of the present meeting, and said that as a member of the Institute he had been greatly impressed by the number and high standard of Papers which had been offered for discussion.

DR. A. B. EVEREST said he was honoured in being asked to present this Paper on behalf of Mr. Sefing, who, unfortunately, was in present circumstances unable to be present at this conference to give his Paper in person. Mr. Sefing had asked him to present his apologies and to express the hope that on future occasions it would be possible for the authors to attend in person. Dr. Everest stated that Mr. Sefing had gladly agreed to present this Exchange Paper, which, he said, was of a high standard and of the type which adequately fulfilled the intention of fostering the exchange of ideas and of improving mutual relationships between kindred associations. He then read the Paper in summary, drawing attention to the salient points and describing some of the illustrations.

The CHAIRMAN thanked Dr. Everest for the excellent way in which he had presented the Paper. A report of the discussion would be transmitted to the Author in America, and they might expect to receive his replies and comments in due course.

Feeding Efficiency

MR. J. F. CHAMBERS said the Author had summarised in the briefest way what was obviously the result of much thought and practical experience, and if he persuaded those foundrymen, and they were many, who did not at present consider the question of isothermals, to do so, and to consider and record the size of risers in a logical way, it would be of great value.

In an extensive experience of high duty iron they had naturally worked on the principles which the Author had put forward and could confirm the major part of his work, but he desired to comment on one or two points. The first was with regard to Table I—the weight of feeder required to supply the necessary amount of liquid metal. The last item in each column of that Table showed the weight of metal to be fed into 100 lbs. of casting. Taking a medium carbon grey iron, this weight was 4.4 lbs. The second line gave the weight of the feeder required per 100 lbs. of casting, and in the case of the round feeder this was 11 lbs. These figures might be theoretically correct, but he was afraid that only on very rare occasions could they achieve 40 per cent. efficiency of riser. In nearly every case it would be necessary to apply a much larger riser weight. He would suggest that 25 per cent. efficiency was the most on which they could possibly count.

In Section V of the Paper, headed "Feeder Connections," the Author recommended a very reduced feeder connection merely for easy removal. In certain cases he agreed that one could by experiment arrive at a balance which made that possible, but it was rather a dangerous practice. The conductivity of such core sand was very low, and that sand could easily hold sufficient heat to retain the adjacent metal liquid after both the riser and the casting became solid, and the result was a shrinkage of the immediately adjacent metal. Therefore he would suggest that one should apply that reduced feeder connection very carefully.

The Author had, presumably in the interests of clarity, eliminated some of the practical considerations which tended to modify the direct mathematical treatment of risers. For example, the size of riser had been related to the section, whereas it would perhaps be more true to say that it was related to cooling rate, and that was not always directly related to section only. The general mass of a casting and the heat conductivity of the sand had a great influence on that cooling rate, and this often called for some departure from the true mathematical relationship between section and riser. He would add, however, that attention to the principles set out was the only way to ensure success and to guarantee soundness in casting.

Feeding Liner Castings

MR. F. DUNLEAVY congratulated Dr. Everest on his summary of the Paper, which, he said, appeared to run parallel with the present work of the Castings Defects Sub-committee. The point that appeared to be omitted from this type of Paper was that several foundries making the same type of casting would use different methods of manufacture, due to the varying conditions of production, all of which could produce sound castings. He could not help thinking that whoever was responsible for the method illustrated in Fig. 6 (*a*) could not have been a foundryman or a patternmaker; he was inclined to think that he must have been someone with very little experience, and could not imagine such equipment being sent into any reputable foundry. Again, in Fig. 7 the same result could be accomplished with much less head, and much less surplus metal, and still prove quite satisfactory. In

regard to Fig. 10 he thought he could see six top runners; they had had a lot of trouble in the old days with non-ferrous liners of various sizes. He recalled a liner of 6 in. dia. and 12 in. in length, that had been presented to various branches of the Institute, by members of the old Non-ferrous Sub-committee, in their report on the atlas of defects in non-ferrous castings. In the first instance the defect was thought to be shrinkage or porosity, and he had seen, as members generally would have seen, the same defect throughout the country.

A similar liner was used by us some years ago, as an experiment, using two or three different methods of running, one of these was as Fig. 10, but was unsatisfactory. The liner was extended 3 in., 6 in., 9 in., and 12 in., with the same result, except that the defect appeared to be pushed higher up in the casting. We then decided that the action of the first flush of metal, dropping down the mould, was to take air down with it, and that much of this air was trapped by the mould and core walls. In view of these experiments it was decided to cast all such liners in the horizontal position, with one large down runner and two ingates, as it was believed that the metal would not have such a long drop, thereby entering the mould much quieter, quite as fast, and over a larger area of the mould, at the same time hastening the cooling rate. Results had proved that this theory was sound in practice. He believed that there was definite need for a Paper of this description, and if it could be combined with a report showing the different methods which were satisfactory, as against the methods which were unsound, much good would result.

Use of Mica Plates

MR. MCRAE SMITH, speaking in connection with the action and function of feeder connections (Section V), referred in particular to Fig. 16, and said the core sizes given there were obviously meant to allow the feeding head to be removed more easily, but it was very difficult to expect uninterrupted feeding to take place, except in large castings, with a core plate thickness of 1½ in. Was this normal practice, or were the core plates often much thinner?

He desired to ask Mr. Sefing whether he had any experience in the use of mica plates or other insulating material in sheet form, which could be used in very thin plates so that there would not be any real interruption in the feeding effect. He considered that Mr. Sefing's Paper was of great interest and value to the foundry generally. It had such a wide scope that one had to use one's own judgment as to the type of metal or alloy to which the individual methods could be applied. He thoroughly agreed with most of the feeding methods illustrated and it was evident they were based on a great deal of practical experience.

DR. EVEREST interposed in reply to Mr. Chambers and said that he had studied Table I and interpreted this as indicating the total amount of metal which had to be fed into a casting, assuming that the whole mould was in the first place filled with liquid metal prior to solidification. In point of fact, however, solidification normally commenced well before the mould was filled so that the total amount of liquid metal required for the final feeding of the casting would be less than the figure shown and depending on metal temperature, speed of pouring, etc. On the other hand, the size of feeding head would, of course, have to be determined, bearing in mind that the feeders were not 100 per cent. efficient and he assumed that the figures presented in Table I were a compromise, taking these different factors into account.

MR. CHAMBERS said that he agreed with Dr. Everest that as far as possible the shrinkage should be made good whilst pouring was taking place, and by that means one could often reduce the amount of shrink head or riser required. But his comment on the Table was that a riser of 11 per cent. of the weight of the casting was expected to make good the shrinkage; that a weight of feeder of 11 lbs. was required to supply 4½ lbs. of metal to be fed into the casting It was asking too much to expect 40 per cent. efficiency of that riser.

The Problem of Rod Feeding

MR. KAIN said that the chief value of the Paper was that it discussed methods for casting "castings," and considered castings as being a corporate body or a corporate family of different metals and alloys. He thought that was a step in the right direction. It meant a gradual realisation of the essential unity of the various branches of the foundry industry and the fundamental sameness of all their problems.

He felt that some of the comments were rather arbitrary, and they might ask Mr. Sefing for his reasons for making them. For example, in dealing with effective feeder design, he stated categorically that feeders should have 50 per cent. greater cross section, or, simply, the thickness of the feeder should be 50 per cent. greater than the thickness of casting to be fed. That was a very definite statement. On what ground was it made? He also stated that much better results were obtained with feeders attached to the side than with top feeders. That also was the experience in his own foundry, but they were not yet satisfied as to the reason why. They did find that side feeding, particularly with the larger type of castings, gave better results.

He noticed that, again dealing with effective feeder design, the Author condemned completely rod feeding. That was rather interesting in view of the Paper* which was to follow, which referred to the old method of rod feeding, and said that the success of this method was acknowledged but not really understood. It was rather interesting that these two Papers given in the same session should contradict one another.

Mr. Sefing made reference to "hot topping," but in his own experience this was not successful, particularly in the case of grey-iron liners or rollers, which were highly polished, such as were used on printing machinery. Always they found an area of open grained metal under the head, and they definitely

* "The Gating and Feeding of Steel Castings" by S. T. Jazwinski, E. D. Wells and S. L. Finch.

found very much better results by not "hot topping" cylindrical castings, which were poured vertically.

MR. MILLS desired also to criticise certain of the figures in Table I. With regard to the steel in the second line, the Author said that the weight of feeder (per 100 lbs. of casting) was 19.75 lbs., the same as for white iron (malleable). On looking at Fig. 8 he could not see how that 19.75 lbs. of head was arrived at. If this Table were correct he would like to take to task one of the sub-committees who a few years ago dealt with some 6-in. cubes and found that it required 70 per cent. of head to make them solid.

Larger Head Needed

MR. J. C. WELLS felt that one or two of the previous speakers had been confusing the theoretical feed capacity with the practical feed capacity. In other words, all the metal of the feeding head did not enter the casting. It was mainly the cold metal which entered the head. Where there had been trouble it had usually been traceable to one of two causes: (1) entry of atmosphere to the head; (2) heads not large enough. The heads had frozen off and the castings had frozen, and in between the two was a hot spot which should have been in the head. In other words, the head should have been a little larger.

High Head or Atmospheric Pressure

MR. S. L. FINCH (K. & L. Steelfounders & Engineers, Limited) said that the Paper gave one an insight into the foundry industry in America. What usually struck him about the American Papers was their economic aspect to the production of castings. In this Paper there were several points which would, however, lead to the uneconomical production of castings. Reference had already been made to the excessive cross-sectional area of a feeder head. The Author recommended 50 per cent. in excess of the section to be fed, yet in Fig. 8 (*b*) he could produce a casting with a head slightly less than the cross-section of the casting itself. The Author recommended a high head to give ferro-static pressure, but he considered that this was hardly essential. By utilising the atmospheric pressure of 52 in. of steel or corresponding values for other metals, the percentage of comparative increase of pressure due to head height was not sufficient to give a sound casting.

On feeder connection he did point out that from 30 to 40 per cent. of the cross-sectional area was necessary to give a sound casting, and this would be difficult to knock off with a complicated contour of the casting. He recommended an excessive bowl on the whirlgate head to prevent freezing, but the speaker did not consider that this was essential. The Author had made a very important point in saying that they should regard all casting methods carefully and make proper records of them, so that in future they would have more information to work upon and steel or other casting industries would benefit by having such records at hand for reference.

MR. COUSANS said that there was just one point upon which he desired to make a comment. It concerned the Author's summary of effective feeder design, in which he stated that proper design and hot metal in the feeder were really applications of the principle of controlled progressive solidification. Much had been made in this Paper of insulation. Were the Americans doing anything in the way of using insulated feeder heads?

Qualifications Sought

MR. F. W. ROWE (K. & L. Steelfounders & Engineers, Limited) paid a tribute to Mr. Sefing for sending what was certainly a most interesting Paper. It was rather a difficult Paper on which to pass judgment or to offer criticism, because it did fulfil a long-standing need for the correlation of the various methods of feeding castings irrespective of the metal in which the casting took place, and perhaps Mr. Sefing at this early stage of their knowledge had attempted a little too much. It was at the moment difficult to enunciate methods of securing sound castings which were equally applicable to all classes of metals and based on the fundamental data of liquid shrinkage. They were very much indebted to him for an excellent *résumé* of the present state of the art, but he felt with a previous speaker that he had been a little too dogmatic in one or two of his statements and not sufficient qualifications were made concerning the type of metal or type of casting in some of the remarks as to the applicability of the methods which he recorded. He thought that in all fairness to Mr. Sefing it should be said that those of them with a broad knowledge of casting various types of metals would agree that each and every one of his statements would find general corroboration when applied to one particular type of casting or one particular type of metal. Some of the criticisms which had, rightly and properly, been voiced were perhaps due to a misunderstanding of the Paper, in that they had referred only to one type of metal, whereas the Author's method had proved useful in other types.

He was bound to repeat what other speakers had said, that the figures in Table I, which so far as he read them gave the amount of metal needed as feeder heads for the various classes of metals, did not correspond with the present state of the art either in this country or the United States. In other words, with the methods as described in the Paper, the average yield of, say, iron or steel castings approached nothing like the figures given in line 2 of Table I. Mr. Sefing had apparently assumed that one should get a 40 per cent. efficiency in a feeder head, but with none of the methods described in the Paper was it possible to do that and at the same time produce sound castings. It did, of course, provide considerable food for thought as showing how far they had to progress before their methods gave them anything like the theoretical yield that one should get. Much alteration to present methods had to be made before obtaining anything like efficient use of feeder heads.

He was also bound to add, with a previous speaker, that the wholesale condemnation of rod feeding was hardly justified. They were all apt to condemn those methods which they did not understand, and he had to confess that throughout his many years' experi-

A Study of Moulding Methods

ence in the foundry industry he had found it hard to put forward theoretical considerations which would explain the use of rod feeding. On the other hand, he had seen this method used very extensively and very successfully. To some extent the success was due to keeping the head open to the atmosphere and securing the effect of atmospheric pressure. He did not think that was the whole of the explanation, but for some reason or other rod feeding was satisfactory for cast iron, and he thought it would continue to be used.

He must confess to some surprise that Mr. Sefing should attempt to be arbitrary as to the section of the feeder head compared with the cross-section of the casting. Everything depended on the type, size, and mass of the casting, and to make an arbitrary 50 per cent. dogmatisation was bold, but not justifiable. Despite these criticisms, he felt that this was a most useful Paper. It had called attention to practically all the methods of feeding which were used up to the present, and pointed the way for a great deal of further work and research on this important subject.

The CHAIRMAN (Mr. P. H. Wilson, O.B.E.) said that the comments which had been made in the course of the discussion would be very much appreciated by the Author, and he had no doubt that the reply received from him in due course would be illuminating. It was interesting to himself to note that in reading through the Paper the very points which he had marked for comment were the points which had been raised by various speakers that afternoon. He agreed that Table I required some elucidation, and he had no doubt that, when they received Mr. Sefing's reply, they would be enlightened on that point. He did not want to comment further on what had already been said about the weight of feeder, but the marked difference in the second line of the Table between the round and the square head was most interesting.

Value of Exchange Papers

Before calling upon Dr. Everest to deal with any of the points on which he might desire to touch, he wished to refer to Mr. Sefing's opening remarks in which he expressed the hope that these international Exchange Papers might contribute towards peaceful scientific relationships between nations and peoples by fostering a cordial exchange of ideas. That was an expression of feeling which they most heartily reciprocated. They had much to learn in that way.

DR. EVEREST said that he felt Mr. Sefing would be gratified at the wide interest which his Paper had aroused and the discussion which had taken place at that meeting. He emphasised that, if any members had other points to make and would put them in writing, they would be forwarded with the report of the discussion to Mr. Sefing. He felt that some of the criticism which had been voiced against the Paper was undoubtedly due to the over-condensation and simplification which were inevitable in dealing with so wide a subject in a Paper of the length presented, and such criticism was really a note asking for elucidation on points which had suffered from this cause. He agreed that Mr. Sefing should be asked for further elucidation of Table I, and no doubt this would adequately be dealt with in Mr. Sefing's reply.

THE MODERN SPECIALISED FOUNDRY

(*Continued from page* 138.)

beneath the hoppers, pushes it along to his mill and releases it. The cores are hand-rammed by female labour, and are placed on a pendulum conveyor which passes round the back of the stoves, ready for loading.

The stoves are of the continuous type. When the cores have been baked, they are placed on a pallet conveyor, passing the front of the stoves. One-half of the pallet is used to receive cores from the stoves, and the other half for cores that have been inspected and passed. The dressed cores are then stored in specially shelved bogies ready to be taken to the mould assembly (Fig. 6).

Fettling Arrangements

When the castings leave the vibrating grate, they are taken along to the cleaning department. A steel shot Wheelabrator is used for this job. After the castings have been cleaned, they are inspected, ground and delivered into the stores ready for machining.

All the sand is checked continuously. The mill operator checks the moisture by means of a speedy moisture tester. Green bond, moisture and permeability are checked hourly by the sand laboratory. Loss on ignition is checked twice daily, sieve test and clay content weekly. All the metal is checked by physical and analytical tests daily. Chill tests, spirals and fracture tests, and temperature readings are done on each charge of metal before casting. A record card is kept of all castings, and their casting and fettling history is recorded each time they are cast, making it possible to back check on any job.

The main reason of success in this foundry is an alert and co-operative management, complete co-operation of patternshop, metallurgists and foundry staff, all of whom are ever striving to reach the peak of production with the maximum of comfort to the employees, and a scrap record worthy of the plant and its staff, and it is believed that when there are more foundries of this nature, offering more scope, engineering and scientific planning and modern control, the foundry industry will be able to claim the amount and type of young labour necessary for its upkeep and progress.

THE MINISTRY OF FUEL AND POWER have issued two more bulletins (Nos. 40 and 42). The former deals with "Combined Power and Heating," and the latter with "The Recovery of Waste Heat from Flue Gases." These bulletins can be obtained free on application to the Ministry of Fuel and Power, 2, Little Smith Street, Westminster, London, S.W.1.

SUBSTITUTES FOR SILICA FLOUR IN THE FOUNDRY

By HAROLD SHAW (Technical Sales Manager, Kingscliffe Super-Refractories, Limited).

The days of silica flour seem to be numbered, and consequently those manufacturers concerned in the refractories industry are doing their utmost to produce adequate substitutes for silica flour, of which a few thousand tons per year are used in steel foundries. It is the object of this article to discuss a few substitute materials which are at present being tried and meeting with varying degrees of success.

In recent times, almost the whole of the numerous makes of silica flour on the market came from North Wales, because there are so many excellent deposits of rocks of high silica content in that region. The rock is crushed and ground in special plants and then graded into different qualities of silica flour, according to grain size of the material. Silica flour for foundry use, however, is usually about 150 mesh in quality, although many foundries prefer an even finer material than this and insist on 200-mesh quality. Naturally, the finer the material the higher the cost of the finished silica flour to the users. A typical analysis of a high-class silica flour is:—Silica, 99.10; lime, 0.05; alumina, 0,55; magnesia, 0.10; loss on ignition, 0.10; and moisture, 0.10 per cent.

Many silica flours at present enjoying a ready sale, and at cheaper prices than the above material, have a lower silica content of 96 to 97 per cent., with a correspondingly higher alumina content of 1.75 to 2 per cent. As the use of silica flour is doomed, what then are the substitute materials at present available for the steel foundry? The writer knows of at least four substitute refractory materials, these being chamotte, zircon, forsterite and molochite. Each of the four materials is discussed briefly below.

Chamotte

Chamotte is not firebrick collected from various sources and ground, but is a high quality aluminous clay which has been calcined and then ground. This fireclay calcination is best carried out in a specially constructed fuel-fired furnace operating under close temperature control and not in an ordinary, circular, down-draft intermittent kiln which cannot but produce uneven calcination. An excellent type of calcining furnace is the automatic underfeed stoker type. The use of such a furnace ensures that the resultant calcined chamotte is extremely consistent in both chemical and physical properties.

A typical analysis of finely ground calcined aluminous chamotte is:—Silica (combined), 55 to 56; alumina, 38 to 39; titanium oxide, 2 to 2½; ferric oxide, 2 to 2½; lime, magnesia and alkalies, less than 1½ per cent.

Its fusion point is in the region of 1,730 to 1,750 deg. C., and, again, what is most important, the chamotte does not contain any free silica. Such silica as is present is in combination with the alumina, as, indeed, it must be, since the material has been calcined at a high temperature.

Zirconium Silicate

Zirconium silicate is found in reasonably large quantities in Madagascar, certain parts of North and South America, and India. The grade being used to replace silica flour is exceptionally pure, the analysis being:—Zirconium oxide, 67.23; ferric oxide, 0.09; titanium oxide, 0.10; rare earths, not detected; phosphoric anhydride, trace; and combined silica (by difference), 32.58 per cent.

Seeing that the zirconium oxide and the silica are fully combined, zirconium silicate does not contain any free silica, thereby eliminating any silicosis risk by its use. Pure zircon is colourless, but the finely ground powders now on the market for founders assume light brown and yellow colours, on account of iron compounds being present as impurities. The presence of these small amounts of impurities does not in most instances have any deleterious effects on the finely ground zirconium silicate.

A good foundry zirconium silicate has a specific gravity of 4.5 to 4.7 and a fusion point about 2,500 deg. C. Of all the materials that have been tried for use as a substitute for silica flour in the foundry trade, zirconium silicate has so far proved the most satisfactory, particularly where steel castings of heavy section have to be considered.

Molochite

This substitute material is enjoying a fair measure of success, particularly on light-weight and medium-sized castings, although the general conclusion so far reached is that under identical conditions of working in the foundry, molochite is not quite as satisfactory as silica flour. However, experiments are still continuing and, with added experience with molochite, it is expected that results comparable with silica flour will be achieved.

Molochite is, in essence, a grog obtained from the calcination of a very high alumina, low iron, and fireclay, so that from certain standpoints molochite bears a resemblance to chamotte, which was discussed earlier. The molochite grog has a high content of mullite ($3Al_2O_3$ $2SiO_2$), which is the only silicate of aluminium stable at high temperatures. A typical analysis of molochite is:—Al_2O_3, about 43; SiO_2, about 54; TiO_2, 0.05; Fe_2O_3, 0.8; CaO, 0.05; and total alkalies, 1.6 per cent.

The specific gravity of molochite is approximately 2.7, and while its refractoriness is often given at about 1,770 deg. C., it is safer to rely on a figure of roughly 1,710 deg. C. for the finely ground material as supplied for foundry purposes. To obtain the best results it is necessary to have a finely divided material; in fact, some 70 per cent. of the material passes through a 300-mesh sieve, which fineness cannot be claimed for the other silica substitutes.

Olivine

It is interesting to learn that trials are being pursued enthusiastically with olivine, the chief source of

supply of which is Norway. The olivine series is one consisting of magnesium orthosilicates having the general formula $2RO\ SiO_2$. The simplest member of the series is forsterite, $2MgO\ SiO_2$; the commonest member of the series, however, is olivine, MgO FeO SiO_2. The melting point of forsterite is usually taken as being 1,910 deg. C., but when fayalite, Fe_2SiO_4, is present as in olivine, the melting point is reduced according to the percentage of fayalite present in the olivine. For instance, Birch and Harvey's equilibrium diagram of the olivine system ("Journal of the American Ceramic Society," 1935) shows that an olivine containing, say, 90 per cent. of forsterite and 10 per cent. of fayalite will begin to melt at about 1,760 to 1,770 deg. C. Hence, for any finely ground olivine used for foundry purposes, it will be essential to know the degree of purity of the olivine. The Norwegian material at present under test has an analysis conforming approximately to the following:—SiO_2, 42; MgO, 49 to 51; iron oxides, 6 to 7; Cr_2O_3, 0.4; Al_2O_3, 0.3; and loss on ignition, 0.5 to 1 per cent.

Other Substitutes

The above brief discussion on the four substitute materials by no means covers the whole story. For example, much experimental work has been done on such refractories as sillimanite and fused alumina, and no doubt many readers have assimilated much useful data about the suitability or otherwise of these two materials as substitutes for silica flour.

TRAINING EXECUTIVES FOR VITREOUS ENAMELLING INDUSTRY

Completion of a three-day refresher course at the Wolverhampton and Staffordshire Technical College, in the enamelling industry, sponsored by Ferro Enamels, Limited, of Wombourne, Wolverhampton, was celebrated at a dinner at Walsall recently. Mr. S. W. Vickery, managing director of the firm, presided. He said that in the conversion period a great responsibility rested upon them to get the industry going to meet a bold programme. He hoped the refresher course would be extended and that the official body—the Institute of Vitreous Enamellers—would carry on in a big way to make plans and provision for the training of young executives.

Mr. W. Todd, past-chairman of the Institute of Vitreous Enamellers, suggested the time was opportune for the setting up of refresher courses for the enamel industry generally, and that machinery was in being to finance such an undertaking.

Mr. J. W. Gardom, president of the Institute of Vitreous Enamellers and of the Institute of British Foundrymen, urged that refresher courses for the older men would be as big, if not a bigger, advantage than for the younger men.

Vitreous enamelling was only imperfectly understood and at the moment was not an exact science, said Mr. F. Harvey. He appealed to education authorities to take the matter in hand and evolve some course of training to meet their particular trade.

NEW CATALOGUES

Pneumatic Hoists and Rams. A four-page illustrated leaflet reaches us from the Consolidated Pneumatic Tool Company, Limited, 232, Dawes Road, London, S.W.6. Its scope extends an earlier publication, SP271, by detailing a number of special types of hoists and by including some data on pneumatic rams. These are becoming more and more popular in foundries for pushing moulding boxes to and from conveyors.

Diamond Tools. The Boston Smelting & Refining Company, Limited, of 4, Broad Street Place, London, E.C.2, have sent us a four-page leaflet which illustrates and describes a range of diamond pointed tools. These are used for the dressing and truing up of grinding wheels. There is a useful table correlating the diameter of the grinding wheel with the recommended diamond sizes.

Welded Joints. The Suffolk Iron Foundry (1920), Limited, of Stowmarket, has issued, under the title of "Strength of Sifbronze Welding," a 28-page, well-illustrated booklet which carries a wealth of technical information clearly set out in some 15 tables. The booklet is available to our readers on writing to Stowmarket.

Electric Lamps and Fittings. Siemens Electric Lamps & Supplies, Limited, 38-39, Upper Thames Street, London, E.C.4, have sent us a copy of Price List No. 980, which gives much data on the "Sieray" fluorescent lamps and fittings. It is available to our readers on application to the firm's publicity manager.

Water Seal Stokers. An advance copy of a brochure comes to us from Nu-way Heating Plants, Limited, of 54, Gillhurst Road, Birmingham, 17. It describes and illustrates a mechanical stoker carrying a patented water seal. It is available in 13 sizes and is applicable to metallurgical furnaces.

CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

AN APPRECIATION OF HOSPITALITY

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—After six and a half years as guests in this country, we feel we should like to avail ourselves of the courtesy of your columns to thank our numerous friends in the British foundry industry for the many kindnesses extended to us. On the eve of our return to Czechoslovakia to reopen our business there, we want to say what a pleasure it will be for us to welcome in Prague all those whose friendship we so much esteem. Au revoir.—Yours, etc.,

ALFRED AND JOHN AUGSTEIN.

Kalcium, Limited,
Praha VII, Bubenska, 5.
October 10, 1945.

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NEWS IN BRIEF

THE LAYING OF A PIPELINE 14½ miles by the United Steel Companies, Limited, from their Sheffield Orgreave coke ovens to supply gas to the Stocksbridge works and area is now in progress.

PLANS HAVE BEEN APPROVED by Wallsend Corporation for the erection of premises for the Parsons and Marine Engineering Turbine Development Association, to be used for research work.

DREDGING AT THE deep-water wharf at Cork has now been so far completed that steamers can now get alongside and discharge cargoes of steel billets consigned to Irish Steel, Limited, Haulbowline.

THE NEW CRANSLEY IRON & STEEL COMPANY, LIMITED, are removing their head office on October 19 from Prince's Chambers, 6, Corporation Street, Birmingham, to their Cransley Furnaces, Kettering.

CONSUMPTION OF COBALT (in terms of cobalt element) in the United Kingdom in the first six months of 1945 amounts to 363 tons, 33 tons of which was in the form of cobalt alloy, 199 tons cobalt metal, and 131 tons cobalt oxides and salts.

THE FORTH VALLEY INDUSTRIAL DEVELOPMENT COUNCIL are pressing the Government to expedite the release of iron moulders. Failure to achieve this, they state, will result in the displacement at no distant date, by reason of the lack of castings, of a considerable number of craftsmen.

GIFTS TOTALLING half a million dollars for establishing a gas turbine laboratory at the Massachusetts Institute of Technology for graduate instruction and fundamental research in this new and promising field of engineering, have been announced by Dr. Jerome C. Hunsaker, head of the departments of aeronautical and mechanical engineering.

SIR WILLIAM LARKE has been released by the Minister of Supply from his post of Controller of Non-Ferrous Mineral Development. Correspondence should now be addressed to the Non-Ferrous Mineral Development Section, Raw Materials Department, Ministry of Supply, Selection Trust Buildings, Masons Avenue, Coleman Street, London, E.C.2.

THE MINISTER OF SUPPLY has agreed to the release of Mr. C. J. Brockbank from his post as Controller of Abrasives, Graphite and Asbestos. Communications should now be addressed to the Abrasives, Graphite and Asbestos Section, Raw Materials Department, Berkeley Court, Glentworth Street, London, N.W.1. Mr. Brockbank will continue to act as adviser to the Ministry on abrasives.

ADDRESSING MEMBERS of the Engineering Industries Association at Manchester, the president, Lord Davidson, appealed to the Government to help the engineering industry, which he described as sick and needing proper treatment. The call-up of toolmakers and younger men for the Forces, he asserted, would retard progress not only in the engineering industry, but in those industries which depended upon the engineering industry.

RECONSTRUCTION OF THE iron and steel industry in the Moselle district of France is proceeding very slowly. Only four blast furnaces are functioning, as against 30 in 1938, while only three Thomas converters have resumed activity. Iron-ore production remains insufficient, the total output in the area amounting to only 103,000 tons in May, compared with an average monthly output in 1938 of over a million tons. The ore mines supplying the blast furnaces of Moyeuvre and Rombas showed a somewhat greater activity, but even here output was only 65 per cent. of the 1938 figures. An increase in iron and steel production depends upon more ample supplies of raw materials, particularly coal.

MR. JOHN WILMOT, Minister of Supply and Aircraft Production, told representatives of the trade union side of the Ministry of Supply Joint Industrial Council last week that 19 Royal Ordnance factories are to be retained by the State for the primary purpose of arms production in peacetime. They are:—Birtley, Bishopton, Blackburn, Bridgwater, Cardiff, Chorley, Dalmuir, Enfield, Fazakerley, Glascoed, Irvine, Leeds, Maltby, Nottingham, Patricroft, Pembury, Radway Green, Swynnerton and Woolwich. Of seven others so far still under consideration, Cardonald was to be allocated by the Board of Trade to alternative work and would cease to be a Royal Ordnance factory. Drigg would continue for the time being on the breaking down of ammunition. Wrexham and Ramskill were at present under expert examination as to their usefulness. The future of Hayes, Poole, and Wigan would be decided when the Ministry was more fully informed as to its commitments.

ADDRESSING A WORKS GATHERING, Sir Claude D. Gibb, chairman of C. A. Parsons & Company, Limited, announced that the firm intended to spend about £1,000,000 on developments within the next few years. Sir Claude stated that purchases of new equipment costing £400,000 had already been authorised, and £250,000 worth had been delivered. The firm had four or five years' work in hand. They wanted to look 10 or 15 years ahead, and this was why they were going to spend large sums of money in modernising equipment. The firm was having to refuse orders because they could not get them through the shops in time. Some of these were orders for new power stations.

THE DIRECTORS of the Glacier Metal Company, Limited, propose to raise new capital and to obtain the sanction of shareholders to a revision of present borrowing powers. It is proposed to increase the capital to £400,000 by the creation of 100,000 preference shares of £1 and 100,000 ordinary shares of 5s. each. At the present stage it is intended to issue 68,000 of the preference and 78,000 of the ordinary shares, the proceeds of which will be used to establish a plant at Kilmarnock in Scotland and to establish two service stations in industrial centres. As the creation of these additional preference shares and the increase in borrowing powers would affect adversely the rights of the existing preference shareholders, and in order to compensate them, it is proposed to increased the fixed cumulative dividend rate of the preference shares from 5½ to 6 per cent., and to make them repayable at 22s. 6d. in a winding up.

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PERSONAL

MR. ANDREW J. BOWRON has been released by the Ministry of Supply to take up the position of production manager at the works of A. Reyrolle & Company, Limited.

MR. R. E. MANNINGHAM-BULLER, M.P., Parliamentary secretary to the Ministry of Works in the late Government, has been appointed a director of Brown Bros., Limited.

MR. R. H. DAWSON has retired from his post as manager of the Don Forge & Engineering Company, Limited, Rotherham, after 45 years' service, including 30 years as manager.

MR. WILLIAM DIXON, a partner in the firm of Merz & M'Clellan, consulting engineers, has been elected chairman of the North-Eastern centre of the Institution of Electrical Engineers.

PROF. A. F. BURSTALL, of the chair of engineering at Melbourne University, Australia, has been appointed to the chair of Mechanical Engineering at King's College, Newcastle-upon-Tyne.

MR. GEORGE HAPPER, who has recently retired from the service of Bruce Peebles & Company, Limited, Edinburgh, after 45 years, was actively concerned with the production of generating plant for many important schemes of electrification.

MR. P. B. HENSHAW, of Kayser Ellison & Company, Limited, has been elected president of the Crucible Steel Makers' Association in succession to MR. S. H. LE TALL (Watson, Saville & Company, Limited), who retired after three years in office.

MR. H. C. DAVIES has been appointed manager of the Cookley Works, Brierley Hill, of Richard Thomas & Baldwins, Limited. Mr. Davies has had a long association with W. & T. Avery, Limited, and more recently has managed their Wolverhampton works at Four Ashes.

MR. GEORGE WANSBROUGH, a member of the Development Areas Advisory Committee, has been appointed chairman of A. Reyrolle & Company, Limited, Hebburn. SIR CLAUDE D. GIBB, who recently relinquished his post in the Ministry of Supply, is the new deputy chairman.

MR. F. G. H. BEDFORD has resigned his post as chairman and joint managing director of C. A. Parsons & Company, Limited, Heaton, Newcastle-upon-Tyne, and has been succeeded by SIR CLAUDE D. GIBB, who has been with the firm for 22 years. Mr. Bedford, who retains his seat on the board of directors and will act in an advisory capacity, has been with the firm for 45 years.

MR. F. E. SMITH and MR. J. L. S. STEEL have been appointed additional directors of Imperial Chemical Industries, Limited. Mr. Smith was chief engineer and a member of the board of the Billingham Division of I.C.I., and for a large part of the war has been acting as chief engineer and superintendent, Armaments Design, at the Ministry of Supply. Mr. Steel has since 1943 been chairman of the Alkali Division of I.C.I.

MR. ANDREW JOLLIE has completed 50 years' service in the steel industry—25 with Steel, Peech & Tozer, of Sheffield. He is now retiring from his routine duties, but will remain as chairman of the Steel, Peech & Tozer board and a director of the United Steel Companies, Limited. Mr. Jollie is chairman of the National Association for Rolled and Re-Rolled Steel Products, in the formation of which he took an active part. He received presentations at a dinner given in his honour in Sheffield.

MR. W. E. A. REDFEARN has been appointed a special director of the English Steel Corporation, Limited, Sheffield. Joining the forge department of Vickers, Limited, in 1915, he later transferred to the sales organisation and has been assistant to the sales manager of the English Steel Corporation, Limited, since its formation in 1929. He is a past-president of Sheffield Trades Commercial Society, a member of the Council of the British Iron and Steel Federation, and a member of the Governing Council of the Association of Drop Forgers and Stampers. During the war Mr. Redfearn was a member of Lord Beaverbrook's Advisory Committee on Aircraft Drop Forgings.

Wills

DIXON, C. W., formerly of H. W. Ward & Company, Limited, machine-tool makers, Birmingham ... £90,811

WHITEHOUSE, N. F. R., of Cornelius Whitehouse & Sons, Limited, edge tool manufacturers, Cannock £4,799

TURNBULL, R. R., of Blundellsands, formerly connected with Grayson, Rollo & Clover Docks, Limited £38,868

WHEWAY, S. B., of Walsall, formerly a director of Job Wheway & Son, Limited, malleable iron-founders £96,016

THOMPSON, A. F. S., of Dunstall Hill House, Wolverhampton, governing director of Thompson Bros. (Bilston), Limited £160,272

ELLIS, SIR WILLIAM H., formerly for many years managing director of John Brown & Company, Limited, president of the Iron and Steel Institute 1924-25, and Master Cutler of Sheffield 1914-18 ... £149,301

EVANS, SIR DAVID OWEN, vice-president of the International Nickel Company of Canada, Limited, delegate director of the Mond Nickel Company, Limited, director of Henry Gardner & Company, Limited, and Tareni Colliery Company, Limited, and chairman of the council of the Copper Development Association £84,762

LIGHT ALLOY PLANTS AT REDDITCH

Negotiations have been completed with the Ministry of Aircraft Production resulting in the acquisition by Tube Investments, Limited, of two light alloy production plants originally erected by them on behalf of the Ministry near Redditch, Worcestershire. An immediate increase in the labour force at the works is scheduled for the production of materials for the Government-sponsored aluminium house, with the development of which the subsidiary companies concerned, Reynolds Tube Company, Limited, and Reynolds Rolling Mills, Limited, have been closely associated. Plans for reorganising and extending the Redditch plants for peacetime production are already under way.

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FOUNDRY PLANT

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COMPANY RESULTS

(Figures for previous year in brackets.)

Manganese Bronze & Brass—Interim dividend of 7½% (same).

Horseley Bridge & Thomas Piggott—Ordinary dividend of 15% (same).

Jonathan Hattersley & Son—Loss on trading for the year ended March 31 of £5,738.

Cochran & Company, Annan—Profit for the year ended June 30 last of £61,493 (£29,337).

Linley Engineering—Dividend of 10% (same) and a bonus of 2½% (5%), making 12½% (15%).

Wm. Neill & Son (St. Helens)—Final dividend of 2½d. (3¼d.) per 2s. share, making 3¼d. (5d.).

Murex—Final dividend on the ordinary stock of 10% and a cash bonus of 2½%, making 20% (same).

George Wilson Gas Meters—Net profit for the year ended March 31, £16,483 (£15,480); final dividend of 7½% (same).

Bromilow & Edwards—Net profit for the year ended March 31, £18,890 (£15,224); dividend of 10% and a bonus of 2½% (same).

Steel & Company—Net profit for the year to March 31 last, £28,034 (£19,099); final dividend of 10%, making 15% (12½%).

Blakey's Boot Protectors—Net profit for the year ended June 30, £19,719 (£16,701); final dividend of 12½% (10%), making 20% (17½%).

Electrolytic Zinc Company of Australasia—Final dividend of 5% on the preference and ordinary shares for the half-year to June 30, making 9% (same).

William Bayliss—Net profit for the period from August 1, 1944, to August 4, 1945, after £2,850 (£4,050) for taxation, £3,376 (£3,448); to general reserve, £1,000 (same); dividend of 7½% (same); forward, £3,599 (£3,473).

Irish Steel—Net profit for the year ended March 31, £38,718 (£26,056); interest, etc., £635; to trade loan redemption reserve, £11,111 (same); taxation, £22,138 (£3,750); credit balance of £6,104 reduces the debit balance forward to £76,176.

William Doxford & Sons—Net profit for the year ended June 30, after tax provision, £184,817 (£173,323); to general reserve, £75,000 (£50,000 to general reserve and £30,000 to contingencies reserve); participating dividend on preference shares of 1% (same); final ordinary dividend of 10%, making 15% (same), plus a bonus of 2½% (nil); forward, £59,332 (£52,015).

Richard Johnson Clapham & Morris—Net trading profit for the year ended June 30, after providing for depreciation, £48,606 (£42,163); fees and staff bonus, £4,500; participating preference dividend of 8% (7%), £2,573 (£2,252); ordinary dividend of 15% (same) and a bonus of 5% (nil), £4,806 (£3,605); taxation £31,500 (£26,000); to general reserve, £5,000 (same); forward, £7,122 (£6,895).

WARTIME IRON AND STEEL PRODUCTION

Additional information is now available concerning the level of iron and steel output achieved during the war years. During 1943, when there was an average of 108 furnaces in blast, pig-iron production averaged 138,200 tons a week. During the same year consumption of home-produced iron ore averaged 329,300 tons per week and imported ore 36,100 tons. There was a decline during 1944, and in January, 1945, the average number of furnaces in blast had fallen to 101, with pig-iron production at 127,100 tons a week and weekly consumption of ore averaging 282,500 tons of home ore and 52,200 tons of imported material. In August last there were 95 furnaces in blast and pig-iron production averaged 125,200 tons per week.

The average weekly production of steel ingots and castings in 1943 was: Carbon steel, 219,900 tons; alloy steel, 30,700; total, 250,600 tons. The 1944 figures were: Carbon, 211,800; alloy, 21,700; total, 233,500 tons. By January, 1945, the weekly production of steel ingots and castings had fallen to 216,200 tons, of which alloy steel represented only 15,000 tons. In August last, the weekly production was 186,100 tons, of which carbon steel represented 10,100 tons. August, of course, was a holiday month and included VJ-Day. Output has since recovered, and in the first two weeks of September reached a weekly average of 236,000 tons, which represents an annual rate of just over 12,250,000 tons.

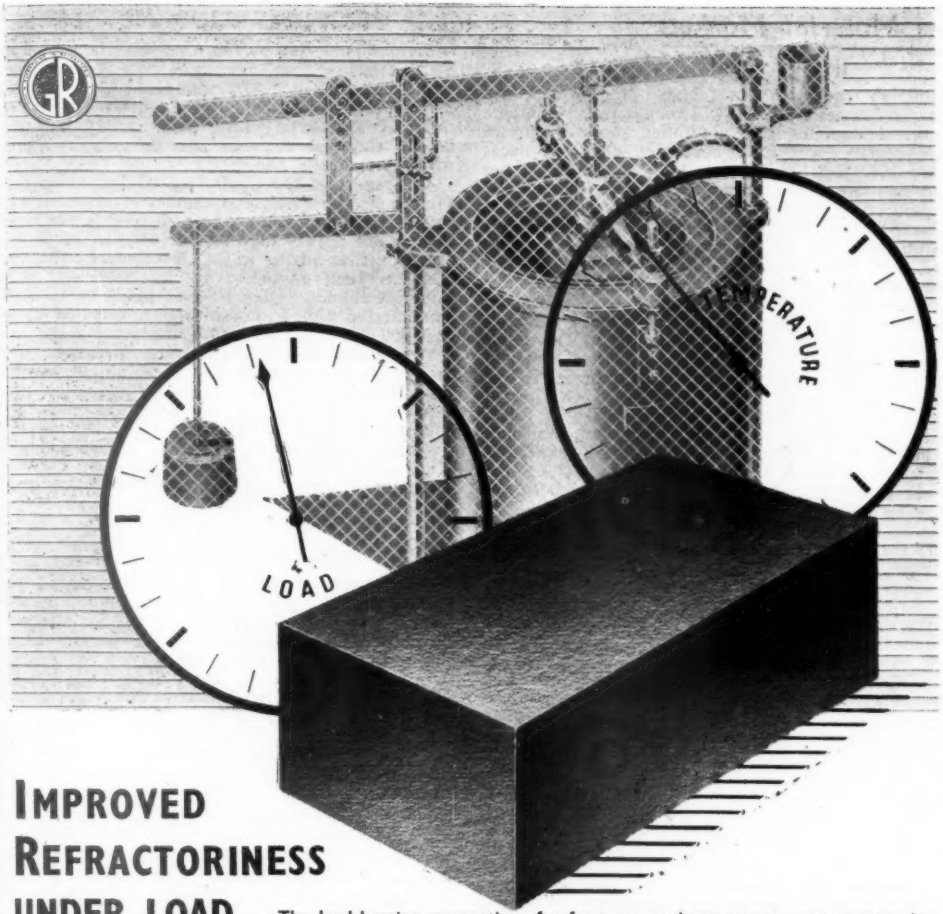
OBITUARY

MR. JAMES GRAIG HOWIE, a director of the North British Steel Foundry, Limited, died recently.

MR. ROBERT HEY, retired ironfounder, died at his home at Strines, Cheshire, on October 4. He was 85.

MR. T. C. CLARK, who has died at the age of 87, was formerly a director of T. & C. Clark & Company, Limited, Shakespeare Foundry, Wolverhampton, which was founded in 1795. He retired some years ago.

DR. WILLIAM JOHN GOUDIE, who occupied the James Watt Chair of the Theory and Practice of Heat Engines at Glasgow University from 1921 until he retired in 1938, has died at Kilmarnock at the age of 77. He entered Glasgow University at the age of 24 after having completed his apprenticeship in the Kilmarnock fitting shops of the old Glasgow & South-Western Railway Company, and having three years' experience in Glasgow with Dubs & Company (now the North British Locomotive Company, Limited). In 1914 he was appointed University Reader in the Theory and Practice of Heat Engines at University College, London, and during the last war Prof. Goudie was engaged on research work for the Air Board. A record of this work, together with technical Papers on steam turbines and other subjects, formed a thesis which gained for him the degree of D.Sc. of Glasgow University.



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Raw Material Markets

IRON AND STEEL

Although requisitions for foundry pig-iron are on a somewhat heavier scale and will very probably continue to increase, supplies have not fallen short of current requirements. Provision of coke for the blast furnaces is accorded special priority, and the more liberal use of foreign ores, which has been made possible by increased imports, has tended to expand the aggregate production of pig-iron. The position, however, is not without its anxieties. Licences are more liberally issued for low-phosphorus iron than for foundry grades, but during the past week or two there have developed signs of increased activity in the demand for engineering castings, which was formerly affected by the cancellation of war contracts. The light-castings foundries, of course, have a lot of work in prospect. Their chief difficulty at the moment is one of man-power. Few foundries are in a position to report any material improvement in their labour force, especially in the light and textile machinery branches, and the work at present available is more than sufficient to keep them going to their full capacity. Some foundries, looking ahead to even busier times, are expressing concern about the position of their pig-iron stocks. Unless these are permitted to be built up during the next month or two, it is feared that serious difficulties will arise, if transport conditions during the winter months interfere with deliveries from the blast furnaces. In the meantime, it is understood that reserves of pig-iron at some of the Midland furnaces are increasing a little.

Improvement is noted in the finished iron trade. Shipbuilders maintain steady support for best iron and bookings for crown and common bars are on a more substantial scale.

The demand for semi-finished steel is as insistent as ever. Re-rollers have in hand an abundance of orders for light sections, bars and strip, while the volume of overseas inquiries for light sheets is far beyond the capacity of the mills. Not the disposal of their output, but the acquisition of material, is the re-rollers' main anxiety. Stocks of semi-finished steel, both at the works and at the command of the Control, have undergone steady erosion, and are now so slender that the arrival of the promised shipments of billets from the Dominions is eagerly awaited. Meanwhile, there is an avid demand for various classes of defective material.

The position at the plate mills continues to improve. A steady flow of specifications from the shipyards, boiler shops, locomotive works and power-plant producers is maintained, and home requirements are now supplemented by a swelling volume of export orders. Mills engaged on heavy structural products are not so favourably situated as the producers of railway and colliery materials. But the busiest of all branches of the steel industry is the sheet trade. Black and galvanised sheets are wanted in unlimited quantities, and buyers seem to be well content to get their orders on the list for execution three to six months hence.

NON-FERROUS METALS

Figures published by the American Bureau of Metal Statistics show that American imports of copper in 1944 totalled 293,758 tons, compared with 307,698 tons in the previous year. In this country the copper position is comparatively easy, and, no doubt, when the labour situation becomes less difficult, consumption will automatically rise.

The report of the Committee of Inspection sent to Malaya by the Malayan Chamber of Mines is eagerly awaited, although it must be realised that the Japanese carried out a very thorough destruction of tin mines. Meanwhile, an adviser to the Government on rehabilitation has been appointed by the Secretary of State for the Colonies. United States stocks of tin in June amounted to 87,454 tons, with an anticipated depletion of 7,000 tons by the end of the year. During the last year of Japanese occupation, Malayan tin production amounted to 158 tons a month, compared with 2,974 tons monthly in 1940.

A heavy demand for zinc sheets is reported, and mills are working to their full basic capacity.

An announcement on Monday by Mr. E. Shinwell, Minister of Fuel and Power, dealt with the coming appointment of a committee to review the question of non-ferrous metal deposits in this country.

NEW DIRECTOR OF F.B.I.

The Grand Council of the Federation of British Industries, at its meeting last week, accepted with great regret the resignation of Sir Guy Locock as Director of the F.B.I. Sir Guy, who has occupied this position for 14 years, first joined the Federation as assistant director in 1918. The Grand Council recorded its great appreciation of the wisdom, ability and tact with which he had carried out his duties, and at their special request Sir Guy has agreed to continue in office until his successor is installed and thereafter to make his services available to the Federation in an advisory capacity.

The Council unanimously approved the appointment as Director General of Mr. N. V. Kipping, to take effect as early in the New Year as his release from Government duties can be arranged.

During the war, Mr. Kipping was head of the regional organisation of the Ministry of Production. With the end of the war and the assumption by the Board of Trade of the continuing functions of the Ministry of Production, he was appointed an Under-Secretary of the Board of Trade and became responsible, *inter alia*, for the Regional Boards as a whole and for the Board of Trade's own regional organisation. Before joining the Ministry of Production, Mr. Kipping was works manager of Standard Telephones & Cables, Limited.

MR. MALCOLM BROWN, a local director of Hadfields, Limited, Sheffield, and works manager of the East Hecla Works, is shortly leaving the company after over 21 years' service.